The quantum computer and the principle of quantum superposition.

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The quantum computer is a hypothetical quantum device that will never be practically realized, since the principle of its operation is contrary to quantum mechanics. More precisely, the principle of quantum superposition. We will show this in detail, for this we turn to the basics of quantum mechanics. The operation of a quantum computer can be analyzed using the principle of quantum superposition, since the operation of a quantum processor is based precisely on quantum superposition.

“A quantum computer is a computing device that uses the phenomena of quantum mechanics (quantum superposition, quantum entanglement) to transmit and process data. A quantum computer (as opposed to a conventional computer) operates not with bits (capable of taking the value either 0 or 1), but with qubits that have values of both 0 and 1. Theoretically, this allows you to process all possible states simultaneously, achieving significant superiority over conventional computers in a number of algorithms...

A quantum computer does not use ordinary (classical) algorithms for computation, but processes of a quantum nature...

If a classical processor at any moment can be in exactly one of the states |0>, |1>, ... |N - 1> (Dirac's notation), then the quantum processor at each moment is simultaneously in all these basic states... This quantum state is called the "quantum superposition" of these classical states..." [1].

Now let's remember quantum mechanics and the principle of quantum superposition.

The basis of mathematical apparatus of quantum mechanics constitutes assertion that the state of a quantum system can be described by a certain function of the coordinates ψ (q) called a wave function (the square of the modulus of this function determines the probability distribution of coordinate values). "Knowledge of the wave function allows in principle to calculate the probabilities of various results and, in general, any measurement (not necessarily measurements of coordinates)" [2].

Let us now analyze the principle of quantum superposition. Consider two quantum states (actually existing), which are described by the wave functions ψ1 and ψ2. It follows from the superposition principle that their linear combination ($\psi 3 = C1\psi 1 + C2\psi 2$) will be the third quantum state (as actually existing), which will be described by the wave function ψ3. What does this mean? This means that when measuring a certain physical quantity d in the state |ψ1> will lead to d1, and

to measure the value for d in the state |ψ2> will lead to d2. When the third quantum state |ψ3> is realized, then when measuring the physical quantity the quantum system will take the values d1 and d2 with the probabilities |C1|^2 and |C2|^2, respectively. That is, in the quantum state |ψ3>, when we have many dimensions, we will sometimes get the d1 value, and sometimes the d2 value (with a certain known frequency). But, we will never get a state when two values d1 and d2 are realized at once. The existence of the third quantum state |ψ3> means only that when measured, on a real physical device (and a quantum processor is such a device), we will sometimes receive the value d1, and sometimes the value d2. But, never a real physical device will "contain" simultaneously two values (d1 and d2). The principle of quantum superposition prohibits this, since quantum superposition is a superposition (mixing) of states that cannot be realized simultaneously from the classical point of view, it is a superposition of alternative (mutually exclusive) states [3]... Therefore, the existence of a quantum computer is impossible.

It is necessary to understand that the third quantum state |ψ3> exists. This is a probabilistic state. And the fact of its existence only indicates that the quantum system is a typical statistical system. This is the structure of the quantum world. Therefore, there is no "real" simultaneous existence of two values (d1 and d2), and cannot be. The coin flip example demonstrates this very well.

Let our coin have a zero image on both sides. This is the first quantum state of the coin |ψ1>. The image on the sides of the coin is a certain property of the quantum system. A coin exists in such a world (for example, in the orbit of the Earth), where it is in constant intensive motion, which does not allow fixing the values that are depicted on its sides (this is a quantum system before measurement). Naturally, if a coin falls on planet Earth, then we will always fix zero. The moment a coin falls is the moment of measuring a physical quantity in a quantum system. A coin behaves similarly in the second quantum state |ψ2>, that is, when the coin has an image of a unit on both sides.

But, if the third quantum state of the coin |ψ3> is realized, then everything will be different. The third quantum state |ψ3>, this is a state when the coin has one side, which depicts one (1), and the other side depicts zero (0). On the orbit of planet Earth, such a coin will be in constant intense movement, and therefore its "value" is not defined. But, if a certain force acts on the coin, and it falls to the Earth, then we will fix either "0" or "1". The moment a coin falls is a measurement of a physical quantity on a real physical device. Moreover, we can fix "0" or "1" only when the coin is stationary and is on the surface, these are certain conditions for registration. If there are no such conditions, then there is no physical quantity, and further reasoning is useless. By definition, a

quantum processor is a device for recording real physical quantities. That is, for it the simultaneous existence of "0" and "1" is fundamentally impossible, since it will register either "1" or "0" (now your computer does this). This means that it is impossible to practically implement a quantum computer. Unfortunately...

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4. Quora. What is a quantum computer? https://qr.ae/pNCpbG